



431 River Road  
Bow, NH 03304

## GSP MERRIMACK

December 19, 2018

U.S. Environmental Protection Agency  
Region 1: New England  
Office of Ecosystem Protection  
Water Technical Unit (OES04 – SMR)  
5 Post Office Square - Suite 100  
Boston, MA 02109-3912

Dear Sir/Madam:

Merrimack Station  
NPDES Permit No. NH0001465  
2017 Annual Fish Impingement Report

Granite Shore Power LLC (GSP) herein submits this Annual Fish Impingement Report for the year 2017 pursuant to Part I., Section A.10.b. of the Merrimack Station NPDES Permit, No. NH0001465. This permit condition requires GSP to conduct impingement monitoring at Merrimack Station according to the provisions below.

- GSP shall provide impingement monitoring at Merrimack Station when flows from Garvins Falls Hydroelectric Station are less than 900 cubic feet per second (cfs) during any period from July 1 through October 15.
- GSP shall collect all fish from both MK-1 and MK-2 traveling screen washes during one continuous 48-hour period per week when the conditions outlined above are met.
- GSP shall report in writing to the New Hampshire Fish & Game Department (NHFGD), United States Fish and Wildlife Service (USFWS), New Hampshire Department of Environmental Services (NHDES) and the United States Environmental Protection Agency (USEPA) any Extraordinary Impingement Event (EIE) at Merrimack Station. An EIE is defined as an event when 50 or more fish at any one time, of any size or species, are either distressed or killed as a result of impingement.

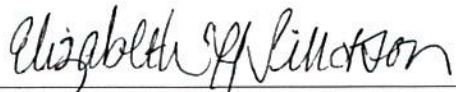
Based on river flows at Garvins Falls Hydro and unit operation, Merrimack Station was required to collect three weekly samples from the intake screens between July 1 and October 15 in 2017. A total of six fish were collected during normal impingement monitoring over the entire sampling season. Impingement rates for the sampling periods were calculated by dividing the total number of fish collected by the total volume of water passed through the units. The volume of water reported is based on circulating pump capacities and the number of pumps that were operating during each screen wash cycle. Each operating unit has two pumps; the pumps servicing Unit 1 are rated at 63 cfs each (126 cfs total), the pumps servicing Unit 2 are rated at 144.5 cfs each (289 cfs total).

Table 1 summarizes the total number of fish collected and the impingement rate for each sampling period. The average impingement rate for 2017 was 0.18 fish per million cubic feet of screened water. As demonstrated each year, the rate of fish impingement at Merrimack Station is extremely low by all industry standards even though the data is collected during worse case conditions, i.e., when river flows are less than 900 cfs. Table 2 identifies the six impinged fish by common name as well as the respective total lengths. Table 3 provides corresponding scientific names of the fish species commonly found in this section of the Merrimack River. All of the weekly data sheets are attached to demonstrate river flows above 900 cfs and the operational status of the two units. There were no extraordinary impingement events in 2017.

If you have any questions regarding this report, please call Allan Palmer at (603) 230-7951.

Sincerely,

GRANITE SHORE POWER

A handwritten signature in cursive script, reading "Elizabeth H. Tillotson".

Elizabeth H. Tillotson  
Executive Director of Administration & Regulatory Affairs

Enclosures

cc: Ms. Sharon M. DeMeo  
US Environmental Protection Agency  
Region 1: New England  
Office of Ecosystem Protection  
Mail Code: OEP  
5 Post Office Square - Suite 100  
Boston, MA 02109-3912

Mr. Eric Nelson  
US Environmental Protection Agency  
Region 1: New England  
Office of Ecosystem Protection  
Mail Code: OEP  
5 Post Office Square - Suite 100  
Boston, MA 02109-3912

NH Department of Environmental Services  
Water Division  
Wastewater Engineering Bureau  
Permits and Compliance Section  
29 Hazen Drive, P.O. Box 95  
Concord, NH 03302-0095

Mr. Joseph F. McKeon  
US Fish and Wildlife Service  
Central New England Fishery Resources Office  
151 Broad Street  
Nashua, NH 03063

Mr. John Magee, Fish Habitat Biologist  
New Hampshire Fish and Game Department  
Inland Fisheries Division  
11 Hazen Drive  
Concord, NH 03301

Ms. Carol Henderson, Environmental Review Coordinator  
New Hampshire Fish and Game Department  
11 Hazen Drive  
Concord, NH 03301

TABLE 1

Merrimack Station  
Fish Impingement Monitoring Program  
2017 Schedule and Impingement Rates

<u>48 Hour Sample Dates</u>	<u>Unit(s) Sampled</u>	<u>48 Hour Flow Through the Units</u>	<u>Impingement Rate</u>	<u>Fish Count</u>
08/02 - 08/04	1	10,886,400 cu. ft.	0.28/million cu. ft.	3
08/15 - 08/17	1	10,886,400 cu. ft.	0.09/million cu. ft.	1
08/29 - 08/31	1	10,886,400 cu. ft.	0.18/million cu. ft.	2

The average impingement rate for the two sampling periods was 0.18 fish per million cubic feet of screened water.

TABLE 2  
Merrimack Station  
Fish Species Collected During Impingement Monitoring  
July 1, 2017 through October 15, 2017

<u>Sampling Period</u>	<u>Fish Species Collected</u>	<u>Total Length (cm)</u>
08/02 – 08/04	Yellow Perch	15
	Yellow Perch	10
	Yellow Perch	27
08/15 – 08/17	Smallmouth Bass	17
08/29 – 08/31	Yellow Perch	19
	Yellow Perch	15

TABLE 3

Merrimack Station  
Scientific Names of Species  
Common in the Merrimack River

Smallmouth Bass	<i>Micropterus dolomieu</i>
Largemouth Bass	<i>Micropterus salmoides</i>
Bluegill Sunfish	<i>Lepomis macrochirus</i>
Pumpkinseed Sunfish	<i>Lepomis gibbosus</i>
Redbreast Sunfish	<i>Lepomis auritus</i>
Brown Bullhead	<i>Ictalurus nebulosus</i>
White Sucker	<i>Catostomus commersoni</i>
Yellow Perch	<i>Perca flavescens</i>
Common Shiner	<i>Notropis cornutus</i>
Spottail Shiner	<i>Notropis hudsonius</i>
Alewife	<i>Alosa pseudoharengus</i>
Chain Pickerel	<i>Esox niger</i>
Northern Pike	<i>Esox Lucius</i>
Creek Chub	<i>Semotilus atromaculatus</i>
Common Carp	<i>Cyprinus carpio</i>
American Eel	<i>Anguilla rostrata</i>





Public Service of  
New Hampshire

# MERRIMACK STATION FISH IMPINGEMENT MONITORING REPORT

JULY 1 TO OCTOBER 15

2017

ENVIRONMENTAL DATA

VTH

# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7/1/17

SAMPLING PERIOD

Begin

End

UNIT STATUS

MK-1

MK-2

CIRC PUMP STATUS

MK-1

MK-2


Species	Total Number of Fish per Species Impinged on the Intake Structure (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				




# **FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION**

Week Ending 7/8/17

**SAMPLING PERIOD**

Begin 

End 

**UNIT STATUS**

MK-1 OFF

MK-2 OFF

**CIRC PUMP STATUS**

MK-1 A

MK-2 OFF

River flow above 900cfs

Species	Total length (in) of up to 20 fish per species (measured to the nearest centimeter)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

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# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7/15/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	ON
MK-2	OFF

CIRC PUMP STATUS

MK-1	A+B
MK-2	A

\* River flow above 900 cfs

Species	Date/Time (MM/DD/YYYY HH:MM)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				



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# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7/22/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	ON
MK-2	ON

CIRC PUMP STATUS



MK-1	A+B
MK-2	A+B

\* River flow above 900 cfs.

Species	Total number of fish per species by 20 minute interval (AM/PM)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 7/29/17

SAMPLING PERIOD  
Begin   
End 

UNIT STATUS  
MK-1 OFF  
MK-2 OFF

CIRC PUMP STATUS  
MK-1 A  
MK-2 OFF

\*River flow above 900 cfs

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				



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# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 8/5/17

SAMPLING PERIOD  
Begin 8/2/17  
End 8/4/17

UNIT STATUS  
MK-1 OFF  
MK-2 OFF

CIRC PUMP STATUS  
MK-1 A  
MK-2 OFF

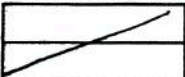
Species	Total Length (mm) or Diameter (cm)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch	15	10	27																	
Common Shiner																				
Spottail Shiner																				
American eel																				
Undetermined Species																				
Additional Fish																				



# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 8/12/17

SAMPLING PERIOD

Begin 

End 

UNIT STATUS

MK-1 OFF

MK-2 OFF

CIRC PUMP STATUS

MK-1 A

MK-2 OFF

\* River flow above 900cfs

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

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FISH IMPINGEMENT MONITORING  
WEEKLY DATA SHEET  
MERRIMACK STATION

Week Ending 8/19/17

SAMPLING PERIOD  
Begin 8/15/17  
End 8/17/17

UNIT STATUS  
MK-1 OFF  
MK-2 OFF

CIRC PUMP STATUS  
MK-1 A  
MK-2 OFF

Species	1000 - 1100 AM (5-20 fish per species) 1100 - 1200 PM (5-20 fish per species) 1200 - 1300 PM (5-20 fish per species)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass	17																			
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Undetermined species																				
Additional Fish																				





# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/2/17

SAMPLING PERIOD  
Begin 8/29/17  
End 8/31/17

UNIT STATUS  
MK-1 OFF  
MK-2 OFF

CIRC PUMP STATUS  
MK-1 A  
MK-2 OFF

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch	19	15																		
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				



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# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/9/17

SAMPLING PERIOD

Begin

End

UNIT STATUS

MK-1

MK-2

CIRC PUMP STATUS

MK-1

MK-2

Species	Total Fish Caught per Species measured in the 1000 ft. sampler (m)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

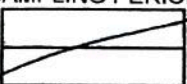


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# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/16/17

SAMPLING PERIOD

Begin 

End

UNIT STATUS

MK-1 OFF

MK-2 OFF

CIRC PUMP STATUS

MK-1 OFF

MK-2 OFF

Species	Date																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

✓Hh

# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/23/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	OFF
MK-2	OFF

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				



✓KHK

# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 9/30/17

SAMPLING PERIOD

Begin	
End	

UNIT STATUS

MK-1	OFF
MK-2	OFF

CIRC PUMP STATUS

MK-1	OFF
MK-2	OFF

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified species																				
Additional Fish																				

✓HH

# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 10/7/17

SAMPLING PERIOD

Begin

End

UNIT STATUS

MK-1

MK-2

CIRC PUMP STATUS

MK-1

MK-2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				

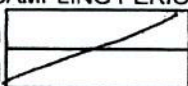


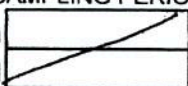
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# FISH IMPINGEMENT MONITORING WEEKLY DATA SHEET MERRIMACK STATION

Week Ending 6/14/17

SAMPLING PERIOD

Begin 

End 

UNIT STATUS

MK-1 OFF

MK-2 OFF

CIRC PUMP STATUS

MK-1 OFF

MK-2 OFF

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Undetermined Species																				
Additional Fish																				



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**FISH IMPINGEMENT MONITORING  
WEEKLY DATA SHEET  
MERRIMACK STATION**

Week Ending 10/21/17

**SAMPLING PERIOD**  
Begin 

/
---

  
End 

/
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**UNIT STATUS**  
MK-1 

OFF
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MK-2 

OFF
-----

**CIRC PUMP STATUS**  
MK-1 

OFF
-----

  
MK-2 

OFF
-----

Species	Hour of Day (1 to 20)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alewife																				
American Shad																				
Small mouth Bass																				
Largemouth Bass																				
Bluegill Sunfish																				
Pumpkinseed Sunfish																				
Redbreasted Sunfish																				
Brown Bullhead																				
White Sucker																				
Yellow Perch																				
Common Shiner																				
Spottail Shiner																				
American eel																				
Unidentified Species																				
Additional Fish																				